

## KITE SAFETY DEVICE

### Related Application

The instant application is a Non-provisional Utility Application claiming priority from U.S. Provisional Application Serial No. 60/394,364 filed July 3, 2002 and currently pending.

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### Field of Invention

The invention pertains to equipment used in the sport of kite surfing and related activities involving kites having controllable airfoils. More particularly, the invention relates to a device for managing the control lines associated with such a kite.

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### Background of the Invention

The present invention relates to multiple line kites. Although the concept of kites has been around for centuries, kiting with multi-meter area kites, capable of lifting the user high into the air and attaining high speed, has become a popular sport in recent years.

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The most common design for this activity is with the use of a four line traction kite.

Typically, the kite has a foil, stabilizing struts, a rigid leading edge, two front lines attached to the front end corners of the kite and two back lines attached to the back end corners of the kite. The other ends of the lines attach to a control bar, held by the user for controlling and manipulating the kite's speed and direction. The back lines attach to the ends of the control

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flying bar, the front lines attach to a center line that may be attached directly to the control flying bar or to the user via a trip loop and a harness.

Several problems arose during the early use of such kites. One such problem is the need to quickly de-power the kite while still retaining control over it. One solution typically employed to accomplish this is a wrist safety leash, attached to the user's wrist or ankle on one end and at a point on one of the back lines on the other end. If users find themselves in an emergency situation, they can completely release the control bar, whereby the kite will de-  
5 power. The problem with the wrist safety leash is that it will cause the kite spin out of control and crash to the ground or water; the user will have no opportunity to regain control of the kite. Furthermore, once the kite is down, the lines of the kite are tangled up with the safety leash causing potentially several hours worth work untangling the lines.

10 Another set of solutions to the need for the need to quickly de-power the kite that are in practice is to allow the user to vary the lengths of the front and back lines while flying the kite. This is accomplished either through use of an adjustable center line strap connected to the front lines, or by allowing the control bar to slide freely over the center line, thereby increasing the effective length of the back lines. While these enabled the user to decrease the  
15 power of the kite and still maintain control, the user is limited by the range of motion of the control bar and the limited adjustability of the adjustable center line strap. Often users may find themselves in situations where the limited amount of de-powering provided by the above devices is insufficient and will have to release the control bar and rely on the safety leash.

Another problem is the tendency of the kite to rotate relative to the control bar during  
20 times when the kite is on the ground or water or if the user rotates the bar while performing stunts. One solution to this was the idea of having the front lines connect to a center line which passes through a hollow tube in the control bar and attaches directly to the user thereby

allowing the back lines to be rotatably independent from the front lines. The problem with this approach is that although it is possible to untwist the back lines, the front lines still remain twisted.

Finally, when users need to land the kite, especially in moderate to strong wind conditions, it generally requires the assistance of a second person to catch the kite to keep the kite from becoming tangled and twisted. Without assistance, users would normally have to release the control bar and pull the kite in by the safety leash attached to one of the lines. As previously stated, this can cause the kite to lose control and its lines become tangled.

It is an objective of the present invention to provide a device for safely and quickly depowering a kite while continuing to maintain control. It is a still further objective of the invention to provide a way for a single user to land a kite unassisted and in a controlled manner so as to prevent the kite from crashing and keeping the lines untangled. It is yet a further objective to provide a device that will prevent the lines from becoming tangled while the kite is use. It is yet another objective to provide a means for increased control of the kite while it is being flown by the safety flying line. Finally, it is an objective of the invention to provide a way to quickly disconnect all loops from the user.

While some of the objectives of the present invention are disclosed in the prior art, none of the inventions found include all of the requirements identified.

## 20 Summary of the Invention

(1) A kite safety device for a kite is according to the present invention may be fabricated for a kite having an airfoil with leading and trailing edges, at least two control lines

attached to distal ends of the airfoil and a control flying bar attached to at least two of the control lines using the following components. A trim line is provided. The trim line has an upper end and a lower end and central passageway extending from the upper end to the lower end and is sized and shaped to fit slidably through a central opening in the control flying bar  
5 of a kite.

The trim line has a first stopper adjacent the upper end and a second stopper adjacent the lower end. The stoppers are sized and shaped to prevent the upper and lower ends of the trim line from passing through the central opening.

An upper swivel is provided. The upper swivel has a top portion and a bottom portion.  
10 Each of the top and bottom portions have a hollow central core, a first end and a second end. The top portion is attached at its first end to the lower end of the trim line. The bottom portion is rotatably attached at its first end to the second end of the top portion and attached at its second end to a trim loop of the kite.

A safety flying line is provided. The flying line has first, second and third segments.  
15 The first segment has a first end and a second end and is attached at its first end to a first point adjacent a midpoint along a centerline extending from the leading edge to the trailing edge. The second segment has a first end and a second end. The second segment is attached at its first end to the second end of the first segment and has a third stopper attached adjacent its second end. The third stopper is sized and shaped to prevent the second end of the second  
20 segment from passing through a ring passage attached to an adjustable strap connected to the upper end of the trim line. The third segment has a first end and a second end and is attached

at its first end to the second end of the second segment and attached at its second end to a first end of an upper portion of a lower swivel.

The upper portion of the lower swivel is rotatably mounted at a second end to a first end of a lower portion of the lower swivel. A second end of the lower portion of the lower  
5 swivel is attached to a fixture. The fixture provides a point for attachment of the flying line to a harness. When said control flying bar is released a user will be free to rotate beneath the kite and when tension is applied to the safety flying line, the kite will begin to stall and the kite will descend.

(2) In a variant of the invention, the second segment of the safety flying line is formed  
10 of resilient material.

(3) In a further variant, the second segment of the safety flying line is capable of elongating to include its original length plus a distance between the third stopper and the ring passage, thereby maintaining tension in said safety flying line.

(4) In still a further variant, the third segment of the safety flying is formed of wear  
15 resistant material, thereby preventing breakage of said third segment due to friction with the central passageway.

(5) In another variant of the invention, the first point is adjustably mounted along the center line, thereby altering performance of said kite when said safety flying line is employed.

(6) In still another variant, the first end of the first segment of the safety flying line is  
20 divided into a front portion and a rear portion. The front portion attaches adjacent to the first point and the rear portion attaches at a second point on the center line behind the front portion.

(7) In yet another variant, the length either of the front portion or the rear portion of the safety flying line is adjustable, thereby permitting stall characteristics of the kite as controlled by the safety flying line to be customized.

(8) In still a further variant, the first end of the first segment of the safety flying line is  
5 divided into a first side portion and a second side portion. The first and second side portions attach adjacent to the second and third points spaced equidistantly from the centerline of the kite.

(9) In another variant of the invention, the positions of the second and third points are adjustable along lines parallel to the centerline.

10 (10) In still another variant, the positions of the second and third points are adjustable toward and away from the centerline.

(11) In still a further variant, the first end of the first segment of the safety flying line is divided into a first side portion, a second side portion and a rear portion. The first and second side portions attach adjacent to the second and third points and are spaced  
15 equidistantly from the centerline of the kite. The rear portion attaches adjacent to the first point.

(12) In yet a further variant of the invention, the positions of the first, second and third points are adjustable along lines parallel to the centerline.

(13) In still a further variant, the positions of the second and third points are adjustable  
20 toward and away from said centerline.

(14) In yet another variant, the upper swivel has a top portion fitted within and secured to the lower end of the trim line. The top portion includes a protruding first bearing surface.

A bottom portion is provided that is formed as a cylinder and has a semi-enclosed upper end. The upper end has a central opening through it and a second mating bearing surface disposed around the central opening. The second mating bearing surface is sized and shaped to fit slidably upon the first bearing surface.

5           A bottom portion is provided that has a chamfered side opening and a central projecting member. A containing cover is provided. The cover has a semi-enclosed upper end. The upper end has a central opening through it. The central opening is sized and shaped to fit slidably over the trim line. The cover is sized and shaped to fit slidably over the upper swivel.

10           (15) In yet a further variant, the first bearing surface and second mating bearing surface are shaped to accommodate either of ball and roller bearings and the upper swivel is a plurality of either of ball and roller bearings.

          (16) In another variant of the invention, the trim loop is formed of resilient material and has a first end and a second end. The first end is attached to the bottom portion of the  
15   upper swivel. The second end has a loop fitting. The loop fitting is sized and shaped to fit over the projecting member and within the chamfered opening. When the loop fitting is placed within the chamfered opening over the projecting member and the containing cover is lowered over the upper swivel, the second end of the trim loop will be secured to the bottom portion of the upper swivel.

20           (17) In still another variant, the fixture providing a point for attachment of the flying line to a harness has a coupling cord. The cord has a first end and a second end and is attached at its first end to the lower portion of the second swivel. An L-shaped hook is

provided. The hook has an orifice at a first end and an upward facing point at a second end and is attached to the second end of the coupling cord at the orifice.

A retaining lanyard is provided. The lanyard has a first end and a second end and is attached at the first end to either of the orifice and the coupling cord. The lanyard has a loop  
5 at the second end and is sized and shaped to fit slidably over the upward facing point of the L-shaped hook. A retaining cap is provided. The cap is sized and shaped to fit slidably over the L-shaped hook and has a semi-enclosed upper end. The upper end has a central opening through it and the opening is sized and shaped to fit slidably over the coupling cord. The cap is disposed upon the coupling cord above the L-shaped hook. When the lanyard is passed  
10 through a ring on a harness and the loop is fitted over the upward facing point forming a closed connection to the ring and the retaining cap is lowered over the L-shaped hook, the safety flying line will be rotatably and removably attached to the harness ring through the lower swivel.

(18) In yet another variant of the invention a length of said safety flying line is  
15 adjustable, thereby providing a user with ability to control lift of said airfoil.

(19) In a final variant of the invention, a kite safety device for a kite having an airfoil with leading and trailing edges, at least two control lines attached to distal ends of an airfoil and a control flying bar attached to at least two of the control lines may be fabricated from the following components. A trim line is provided. The trim line has an upper end and a lower  
20 end and central passageway extending from the upper end to the lower end and is sized and shaped to fit slidably through a central opening in the control flying bar of a kite.



A safety flying line is provided. The safety flying line has a first end and a second end and is attached at its first end to a first point adjacent a midpoint along a centerline extending from the leading edge to the trailing edge of the kite. The second end is attached to a fixture. The fixture provides a point for attachment of the flying line to a harness. When the control flying  
5 bar is released a user will be free to rotate beneath the kite and when tension is applied to the safety flying line, the kite will begin to stall and the kite will descend.

An appreciation of the other aims and objectives of the present invention and an understanding of it may be achieved by referring to the accompanying drawings and the detailed description of a preferred embodiment.

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#### Description of the Drawings

**Figure 1** is a perspective view of a four line kite with the kite safety device depicting the safety flying line, trim line, stoppers, a swivel, and control lines;

**Figure 2** is a perspective view of the **Figure 1** embodiment illustrating a safety flying  
15 line having a first segment with two portions displaced fore and aft;

**Figure 3** is a perspective view of the **Figure 1** embodiment illustrating a safety flying line having a first segment with two portions displaced horizontally about the centerline of the kite;

**Figure 4** is a perspective view of the **Figure 1** embodiment illustrating a safety flying  
20 line having a first segment with two portions displaced horizontally about the centerline of the kite and a third portion displaced rearwardly along the centerline;

**Figure 5** is a perspective view of a two line kite with the kite safety device depicting the safety flying line and trim line;

**Figure 6** is a perspective view of the **Figure 5** embodiment illustrating a safety flying line having a first segment with two portions displaced horizontally about the centerline of the  
5 kite;

**Figure 7** is a perspective view of the **Figure 5** embodiment illustrating a safety flying line having a first segment with two portions displaced fore and aft;

**Figure 8** is a perspective view of the **Figure 5** embodiment illustrating a safety flying line having a first segment with two portions displaced horizontally about the centerline of the  
10 kite and a third portion displaced rearwardly along the centerline;

**Figure 9** is a detailed front view of the **Figure 1** embodiment illustrating the safety flying line, trim line, upper swivel, lower swivel, control lines, control flying bar, trim loop, and fixture;

**Figure 10** is a detailed back view of the **Figure 1** embodiment depicting the safety  
15 flying line, trim line, ring passage and the control flying bar;

**Figure 11** is an detailed front view of the **Figure 1** embodiment illustrating the control flying bar, the trim line and central opening in the control flying bar illustrating relative motions of the control flying bar and trim line;

**Figure 12** is an detailed front view illustrating the safety flying line, trim loop, second  
20 stopper, upper swivel, lower swivel, loop fitting, projecting member, chamfered opening and containing cover;

**Figure 13** is a detailed cross-sectional front view illustrating the safety flying line, trim line, trim loop, second stopper, upper swivel, lower swivel, loop fitting, projecting member, chamfered opening and containing cover;

**Figure 14** is an detailed front view illustrating the safety flying line, trim loop, stopper, lower swivel, upper swivel, fixture, coupling cord, retaining lanyard, L-shaped hook, and retaining cap;

**Figure 15** is a perspective view illustrating operation of the kite by the safety flying line; and

**Figure 16** is a detailed perspective view illustrating attachment of the trim loop and the safety flying line to a harness.

#### Detailed Description of the Preferred Embodiment

(1) **Figures 1-16** illustrate a kite safety device **305** for a kite **250** that has an airfoil **60** with leading **20** and trailing **22** edges, with at least two control lines **11, 12, 13, 14** attached to distal ends **110, 111** of the airfoil **60** and a control flying bar **50** attached to at least two of the control lines **11, 12, 13, 14**. The safety device **305** has a trim line **1**. The trim line **1** has an upper end **310** and a lower end **315** and central passageway **320** extending from the upper end **310** to the lower end **315** and is sized and shaped to fit slidably through a central opening **70** in the control flying bar **50** of a kite.

The trim line **1** has a first stopper **2** adjacent the upper end **310** and a second stopper **130** adjacent the lower end. The stoppers **2**, **130** are sized and shaped to prevent the upper **310** and lower **315** ends of the trim line **1** from passing through the central opening **70**.

5 As shown in **Figures 12** and **13**, an upper swivel **4** is provided. The upper swivel **4** has a top portion **35** and a bottom portion **34**. Each of the top **35** and bottom **34** portions have a hollow central core **325**, a first end **330**, **335** and a second end **340**, **345**. The top portion **35** is attached at its first end **330** to the lower end **315** of the trim line **1**. The bottom portion **34** is rotatably attached at its first end **335** to the second end **340** of the top portion **35** and attached  
10 at its second end **345** to a trim loop **30** of the kite **250**.

Referring to **Figures 1 – 9** and **13**, a safety flying line **10** is provided. The flying line **10** has first **10a**, second **10b** and third **10c** segments. The first segment **10a** has a first end **350** and a second end **355** and is attached at its first end **350** to a first point **360** adjacent a midpoint **365** along a centerline **101** extending from the leading edge **20** to the trailing edge  
15 22. The second segment **10b** has a first end **370** and a second end **375**. The second segment **10b** is attached at its first end **370** to the second end **375** of the first segment **10a** and has a third stopper **6** attached adjacent its second end **375**. The third stopper **6** is sized and shaped to prevent the second end **375** of the second segment **10b** from passing through a ring passage **380** attached to an adjustable strap **55** connected to the upper end **310** of the trim line **1**. The  
20 third segment **10c** has a first end **385** and a second end **390** and is attached at its first end **385** to the second end **375** of the second segment **10b** and attached at its second end **390** to a first end **405** of an upper portion **395** of a lower swivel **5**.

The upper portion **395** of the lower swivel **5** is rotatably mounted at a second end **410** to a first end **415** of a lower portion **400** of the lower swivel **5**. A second end **420** of the lower portion **400** of the lower swivel **5** is attached to a fixture **140**. The fixture **140** provides a point for attachment of the safety flying line **10** to a harness **425**. When said control flying bar **50** is released a user will be free to rotate beneath the kite **250** and when tension is applied to the safety flying line **10**, the kite **250** will begin to stall and the kite **250** will descend.

(2) In a variant of the invention, the second segment **10b** of the safety flying line **10** is formed of resilient material.

(3) In another variant, referring to **Figure 1**, the second segment **10b** of the safety flying line **10** is capable of elongating to include its original length **435** plus a distance **430** between the third stopper **6** and the ring passage **380**, thereby maintaining tension in said safety flying line **10**.

(4) In still another variant, the third segment **10c** of the safety flying line **10** is formed of wear resistant material, thereby preventing breakage of said third segment **10c** due to friction with the passageway **320**.

(5) In yet another variant, as shown in **Figures 1, 2, 5, and 7**, the first point **360** is adjustably mounted along the center line **101**, thereby altering performance of said kite **250** when said safety flying line **10** is employed.

(6) In another variant of the invention, as shown in **Figure 2**, the first end **350** of the first segment **10a** of the safety flying line **10** is divided into a front portion **96** and a rear portion **92**. The front portion **96** attaches

adjacent to the first point **360** and the rear portion **92** attaches at a second point **440** on the center line **101** behind the front portion **96**.

(7) In a further variant, the length either of the front portion **96** or the rear portion **92** of the safety flying line **10** is adjustable, thereby permitting stall characteristics of the kite **250** as controlled by the safety flying line **10** to be customized.

(8) In still a further variant, as shown in **Figures 1** and **3**, the first end **350** of the first segment **10a** of the safety flying line **10** is divided into a first side portion **90** and a second side portion **91**. The first **90** and second side portions **91** attach adjacent to second **450** and third **445** points spaced equidistantly from the centerline **101** of the kite **250**.

(9) In yet another variant, the positions of the second **450** and third **445** points are adjustable along lines **455**, **460** parallel to the centerline **101**.

(10) In yet an further variant of the invention, the positions of the second **450** and third **445** points are adjustable toward and away from the centerline **101**.

(11) In still a further variant, as shown in **Figure 4**, The first end **350** of the first segment **10a** of the safety flying line **10** is divided into a first side portion **90**, a second side portion **91** and a rear portion **92**. The first **90** and second **91** side portions attach adjacent to the second **445** and third **450** points and are spaced equidistantly from the centerline **101** of the kite **250**. The rear portion **92** attaches adjacent to the first point **360**.

(12) In yet a further variant, the positions of the first **360**, second **445** and third **450** points are adjustable along lines **455**, **460** parallel to the centerline **101**.

(13) In still a further variant, the positions of the second **445** and third **450** points are adjustable toward and away from said centerline **101**.

(14) In another variant, as shown in **Figures 12** and **13**, the upper swivel **4** has a top portion **35** fitted within and secured to the lower end **315** of the trim line **1**. The top portion **35** includes a protruding first bearing surface **465**. A bottom portion **470** is provided that is formed as a cylinder and has a semi-enclosed upper end **475**. The upper end **475** has a central opening **480** through it and a second mating bearing surface **485** disposed around the central opening **480**. The second mating bearing surface **485** is sized and shaped to fit slidably upon the first bearing surface **465**.

The bottom portion **470** has a chamfered side opening **121** and a central projecting member **495**. A containing cover **81** is provided. The cover **81** has a semi-enclosed upper end **3**. The upper end **3** has a central opening **505** through it. The central opening **505** is sized and shaped to fit slidably over the trim line **1**. The cover **3** is sized and shaped to fit slidably over the upper swivel **4**.

(15) In still another variant, the first bearing surface **465** and second mating bearing surface **485** are shaped to accommodate either of ball **150** and roller bearings **150** and the upper swivel **4** is a plurality of either of ball (not shown) and roller bearings (not shown).

(16) In yet another variant, the trim loop **30** is formed of resilient material and has a first end **119** and a second end **88**. The first end **119** is attached to the bottom portion **345** of the upper swivel **4**. The second end **88** has a loop fitting **120**. The loop fitting **120** is sized and shaped to fit over the projecting member **495** and within the chamfered opening **121**. When the loop fitting **120** is placed within the chamfered opening **121** over the projecting member **495** and the containing cover **3** is lowered over the upper swivel **4**, the second end **88** of the trim loop **30** will be secured to the bottom portion **345** of the upper swivel **4**.

(17) In yet an further variant, as shown in **Figure 14**, the fixture **140** providing a point for attachment of the flying line **10** to a harness **425** has a coupling cord **520**. The cord **520** has a first end **522** and a second end **524** and is attached at its first end **522** to the lower portion **400** of the lower swivel **5**. A L-shaped hook **160** is provided. The hook **160** has an orifice **525** at a first end **530** and an upward facing point **535** at a second end **540** and is attached to the second end of the coupling cord **520** at the orifice.

Referring to **Figures 14** and **16**, a retaining lanyard is provided **545**. The lanyard **545** has a first end **550** and a second end **555** and is attached at the first end **550** to either the orifice **525** or the coupling cord **520**. The lanyard **545** has a loop **560** at the second end **555** and is sized and shaped to fit slidably over the upward facing point of the L-shaped hook **160**. A retaining cap **7** is provided. The cap **7** is sized and shaped to fit slidably over the L-shaped hook **160** and has a semi-enclosed upper end **565**. The upper end **565** has a central opening **570** through it and the opening **570** is sized and shaped to fit slidably over the coupling cord



520. The cap 7 is disposed upon the coupling cord 520 above the L-shaped hook 160. When the lanyard 545 is passed through a ring 575 on a harness 425 and the loop 560 is fitted over the upward facing point 535 forming a closed connection to the ring 575 and the retaining cap 7 is lowered over the L-shaped hook 160, the safety flying line 10 will be rotatably and  
 5 removably attached to the harness ring 575 through the lower swivel 5.

(18) In still another variant of the invention, the length of the safety flying line 10 is adjustable, thereby providing a user with ability to control lift of the airfoil 60.

(19) In a final variant, as shown in **Figures 1-16**, a kite safety device 305 for a kite 250 that has an airfoil 60 with leading 20 and trailing 22 edges, at least two control lines 11,  
 10 12, 13, 14 attached to distal ends 110, 111 of the airfoil 60 and a control flying bar 50 attached to at least two of the control lines 11, 12, 13, 14.

The safety device 305 has a trim line 1. The trim line 1 has an upper end 310 and a lower 315 end and central passageway 320 extending from the upper end 310 to the lower end 315 and is sized and shaped to fit slidably through a central opening 70 in the control flying  
 15 bar 50 of a kite 250.

A safety flying line is provided 10. The safety flying line 10 has a first end 600 and a second end 605 and is attached at its first end 600 to a first point 360 adjacent a midpoint 365 along a centerline 101 extending from the leading edge 20 to the trailing edge 22 of the kite 250. The second end 605 is attached to a fixture 140. The fixture 140 provides a point for  
 20 attachment of the flying line 10 to a harness 425. When the control flying bar 50 is released a user will be free to rotate beneath the kite 250 and when tension is applied to the safety flying line 10, the kite 250 will begin to stall and the kite 250 will descend.

The kite safety device **305** has been described with reference to particular embodiments. Other modifications and enhancements can be made without departing from the spirit and scope of the claims that follow.